Fetal double aortic arch: 2D and 4D echocardiography, associations and outcome
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Objective
To describe associations and outcome of double aortic arch (DAA) in the fetus, and to analyze its fetal two-dimensional (2D) echocardiographic characteristics, and to explore whether the use of 4D ultrasound with B-flow imaging and spatiotemporal image correlation (STIC) can improve prenatal diagnostic accuracy.

Methods
The study comprised fetuses examined exclusively by 2D conventional echocardiography and those identified by conventional echocardiography and examined further by 4D ultrasound with B-flow imaging and STIC during the period January 2007 to March 2015, at two referral centers for congenital heart defects (CHD). Postnatal follow-up was available in all cases. Karyotyping and fluorescent in-situ hybridization (FISH) analysis for the DiGeorge critical region (22q11.2) were performed in all cases.

Results
Twenty-one cases of DAA were detected among 2120 cases of fetal CHD. Two-D echocardiography failed to distinguish the type of aortic arch anomalies in only two cases (right aortic arch instead of DAA). In these cases B-flow imaging and STIC successfully identified DAA and clearly visualized the dominance of one arch. The dominant branch of the double aortic arch was right in most of cases. Associated cardiac anomalies were present in 23%, with non-cardiac anomalies in 19%. In 3 cases a genetic anomaly was associated (two 22q11 microdeletion cases and one trisomy 21 case). In two cases parents underwent termination. Postnatally, clinical symptoms were present in all but four cases at a median age of 3 months. One case was lost at follow up.

Conclusion
Our results confirm the feasibility of prenatal characterization of DAA based on 2D echocardiographic examination. Four-D ultrasound with B-flow imaging and STIC can apparently facilitate visualization and detailed examination of the anatomical features of the DAA. In most of the cases DAA was isolated. 22q11 microdeletion is the genetic anomaly mostly associated. The most common symptoms were respiratory and gastrointestinal.